Filtering of drugs for injection among a sample of people who regularly inject illicit drugs in Australia, 2024

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Key Findings

Amongst the sample of people who inject drugs recruited as part of the 2024 Illicit Drug Reporting System survey:

Nearly **two thirds** of participants used some type of filter in the past month.

However, the most commonly used filters were **cigarette filters** or **cotton balls**, which only remove very large particles and do not provide sterilisation.

Use of filters dramatically differed across cities, with 50% or less of people in **Hobart, Adelaide** or **Darwin** reporting any filtering.

Filtering to remove bacteria and **sub-visible particles** is **important** to **reduce harms** for every injection, but is **particularly important** for **people injecting pharmaceuticals**. Filtering uptake did not significantly differ between people that did and did not inject pharmaceuticals, but a near universal level of filtering was seen among people in Canberra - showing that these cultures are possible.

In 2024, the national IDRS sample included 884 participants. Annual interviews were conducted with people aged 18 or older residing in capital city areas of Australia who injected illicit or non-prescribed drugs ≥six days in the preceding six months.

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Introduction

For medications to meet the requirements for safety for injection, regulatory systems require that the preparation is sterile (free from viable micro-organisms like bacteria), be free of visible particles (typically less than 100µm), and contain extremely low levels of sub-visible particles (1). Illegal drugs meet none of these criteria – they are often contaminated with bulking or cutting agents, unwanted remnants of the production process, bacteria from handling, and dust and dirt from the general environment.

Pharmaceutical tablets designed for oral use often contain many inactive ingredients to provide shape or function. Some of these, like lactose monohydrate, macrogol or povidone will dissolve readily in water; many, like talc, microcrystalline cellulose, magnesium stearate will not dissolve and will produce heavily contaminated solutions that are visibly cloudy to the eye (2).

The limits of visibility of a particle in solution is around 100µm, around the typical width of a human hair. In the lungs, the micro-circulatory capillaries are 5-10µm in diameter, meaning that they can be easily blocked by sub-visible particles. Bacteria such as *staphylococcus aureus* and *streptococcus* are a common cause of injection-related infections and are typically in the range of 0.5-1.0µm (2).

In Australia, there are a range of filters available to reduce harms from injection of illegal drugs and pharmaceutical tablets. Many people use cigarette filters that are typically able to filter particles larger than 50µm (3). Commercial filters are also available. Apothicom produces: sterile cotton pellets (in the Stericup) that provides good filtering of particles larger than 10µm (4); the screw-on tip sterifilt basic with a 10µm membrane; and sterifilt+ with an 0.22µm membrane. There are other brands of wheel filters that have membranes of 0.22 and 0.45µm. These very fine membranes are able to remove most bacteria from contaminated samples (5).

In an earlier Drug Trends Bulletin (6) we reviewed changes in the uptake of commercial filters among samples of people who frequently inject drugs interviewed as part of the Illicit Drug Reporting System (IDRS), showing that past month use of commercial filters had doubled from around one in four participants in 2016 to more than half of those interviewed in 2020. The current bulletin aims to provide an update to these figures, examining the reported use of filters among the 2024 IDRS sample of people who regularly inject drugs.

Methods

Data was collected as part of the Illicit Drug Reporting System (IDRS). Annual interviews are conducted with people aged 18 or older, residing in capital city areas of Australia, who have injected illicit or non-prescribed drugs ≥ six days in the preceding six months. In 2024, 884 participants were recruited from capital cities in each jurisdiction, with a target of 150 participants in Melbourne and Sydney, and 100 in the remaining cities. These interviews were conducted predominately via face-to-face surveys, with some conducted via telephone following the onset of the COVID-19 pandemic. Please refer to the IDRS Background and Methods document for further details.

Participants were asked whether they had used wheel filters, sterifilt basic filters, sterifilt plus, commercial cotton filters (sterifilt) or cigarette filters/cotton balls in the past month; and whether they had experienced problems with accessing these in the past month (with the exception of cigarette filters/cotton balls). They were also asked if they had re-used (their own) wheel filter, sterifilt filter (basic or plus), or commercial cotton filters in the past month; and finally, if they had used a wheel filter or any other type of filter after someone else in the past month.

We created a variable to determine if participants had reported any injection of a pharmaceutical in the past six months, which included physeptone, buprenorphine (tablet or film), oxycodone, morphine, fentanyl, codeine, tapentadol, tramadol, pregabalin, gabapentin, dexamphetamine, methylphenidate, lisdexamfetamine, modafinil, benzodiazepines, antipsychotics or unisom gel capsules.

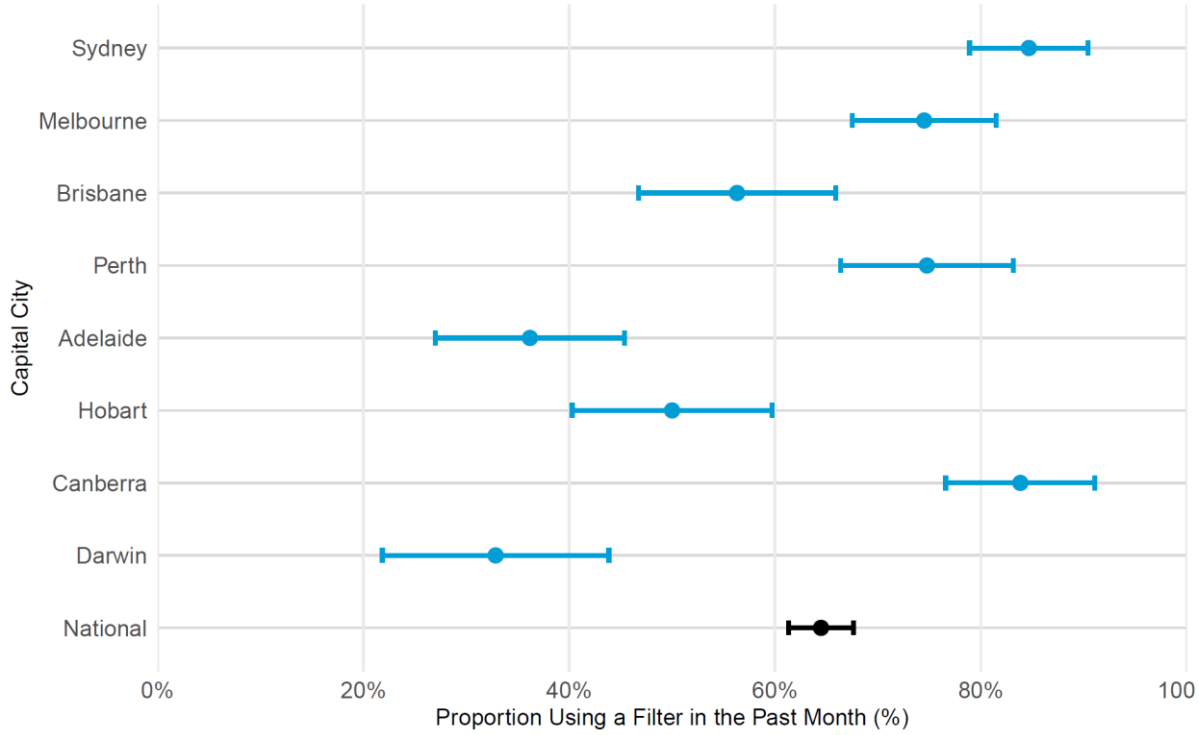
The proportion of participants in each city reporting use of any type of filter were reported using 95% confidence intervals using the Wald (normal-approximation) interval; comparisons between proportions were calculated using Pearson chi-square tests of independence.

For information regarding the characteristics of the national IDRS sample in 2024, please refer to the National 2024 IDRS report.

Results

Nationally, 64.5% of the IDRS participants in 2024 reported using some type of filter in the previous month (Figure 1). There was significant variation in reports of filter use across capital cities: $\chi^2(7)=133.74$, $p<0.001$. Percentages were highest in Sydney, Melbourne, Perth and Canberra and significantly lower in Hobart, Adelaide and Darwin (pairwise Holm adjusted).

Figure 1: Proportion of IDRS participants in each city (with 95%CI) reporting use of any filter for injection in the past month (2024, n=881).



Results

The most commonly used filters were the least effective (cigarette filters/cotton balls: 43%). Conversely, the most effective sterilising filters were used less commonly (Sterifilt plus: 3%; wheel filters: 12%).

Table 1: Summary of filter use (n=881) among IDRS participants in 2024

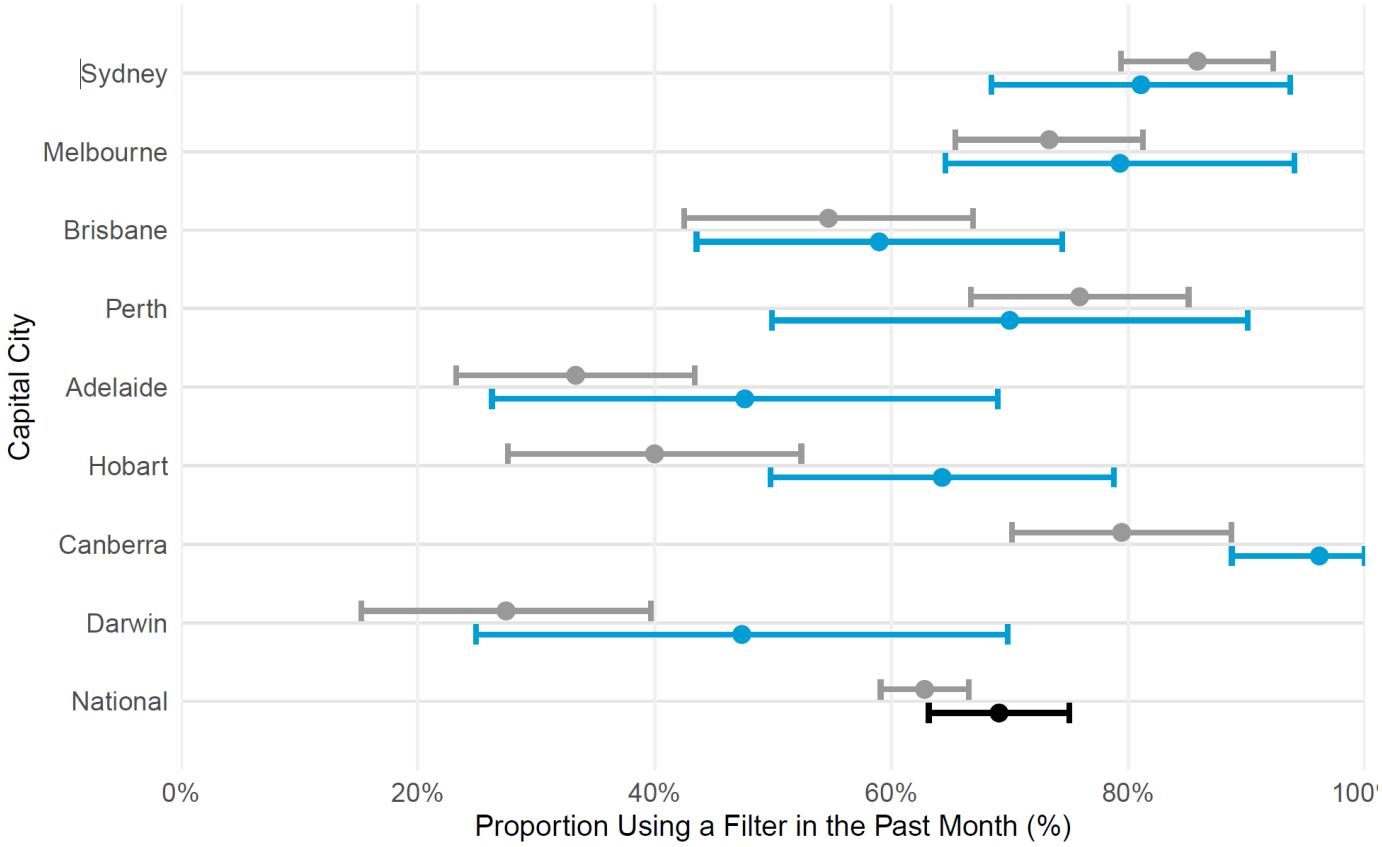
		Among those who had used these filters		
	Used in last month % (n)	**Had problems accessing % (n)**	**Re-used own % (n)**	**Used after someone else % (n)**
Wheel filter	12.5 (n=110)	9 (n=10)	7 (n=8)	n≤5
Sterifilt plus	3.1 (n=27)	n≤5	n≤5^	3.3 (n=7)#
Sterifilt basic	6.7 (n=59)	14 (n=8)		
Commercial cotton (Sterifilt)	18.6 (n=164)	5 (n=9)	-	
Cotton balls, cigarette filters	42.8 (n=377)	-	-	-
Any filter	**64.5 (n=568)**	**3.5 (n=20)**	**7.2 (n=11)**	**3.3 (n=9)**

Note: ^=any sterifilt filter (basic or plus); #=any filter other than wheel filter and cotton balls/cigarette filters; - = not asked. Per cent suppressed in cases of n≤5 observations.

Because drug preparations from pharmaceuticals not designed for injection will have more particulate contamination - and potential for harm - than drugs such as methamphetamine or heroin which dissolve more readily, participants were divided according to whether they had injected any pharmaceutical in the past 6 months, and those that had not. The proportion of participants who reported any recent filter use in both these groups is summarised below in Figure 2. Nationally, 69% of those that had injected a pharmaceutical reported recent use of a filter, compared to 63% of those that had not. This was not a significant difference: $\chi^2(1) = 2.96$, $p=0.085$. In most cities, filtering did not significantly differ between those that had injected a pharmaceutical and those that had not ($p>0.100$) - the exception was Hobart (64% vs 40%; $p=0.016$), with non-significant a trend observed in Canberra (96% vs 80%; $p=0.062$).

Results

Figure 2: Proportion of IDRS participants (with 95%CI) in each city reporting use of any filter for injection in the past month (2004, n=881), stratified by those who had (coloured) or had not (grey) injected a pharmaceutical in the past six months.



As noted in Table 1, few participants reported having trouble accessing any of these commercial filters if they wanted them and re-use or receptive sharing were low.

Discussion

In 2024, six in ten IDRS participants had used some sort of filter in the past month. The most commonly used filters were cotton balls and cigarettes filters – while useful, these are the least effective types of filters, as they only remove extremely large particles (primarily visible particles and those >50µm) and do not provide sterilisation. Thirty-one percent of participants reported use of any commercial filter, which is a substantial reduction from the proportion reported in 2020 (50%: see 6), and 14% reported use of sterilising filters (wheel or Sterifilt plus), similar to 2020.

While the overall use of filters in the 2024 IDRS sample is substantial – especially among participants in Sydney, Canberra, Melbourne and Perth – there is substantial scope to increase uptake, particularly, among people who inject pharmaceuticals, who are at the greatest risk of harm. Lower uptake may relate to concerns about the time and difficulty of the filtering process, as well as (unfounded) concerns about loss of active drug (2, 7-8). However, evidence suggests that these barriers can be effectively addressed by structured education interventions delivered by health workers (7) or peers (9). The data from Canberra demonstrate that extremely high uptake of filtering is achievable – it would be worthwhile understanding how this culture has been cultivated, particularly for areas where filtering uptake was low (Adelaide, Hobart, Darwin, and to a lesser extent, Brisbane).

It is also worth noting that methamphetamine is now the predominant drug injected by IDRS participants, with use of pharmaceutical opioids steadily declining (10). Methamphetamine is readily soluble, leaving little visual evidence of particulate contamination when prepared for injection – some people may therefore perceive less need for filtering these solutions. However, common cutting agents such as N-isopropyl-benzylamine or dimethyl sulfone (MSM) have slow or low solubility and may produce particles <100µm. Further, trace metals (nickel, palladium, lithium) or phosphorus or iodine crystals from production processes may produce insoluble but poorly visible contaminants still large enough to cause harm (11-13), and bacterial contamination can also cause substantial harm (14). These risks highlight the continued importance of promoting good filtering (with < 0.8µm filters) and sterile injecting site preparations for people injecting these substances.

References

1. Medicines and Healthcare products Regulatory Agency (MHRA). (2024). *British Pharmacopoeia 2025* (Complete ed.). TSO (The Stationery Office).
2. McLean, S., Patel, R., & Bruno, R. (2017). Injection of pharmaceuticals designed for oral use: Harms experienced and effective harm reduction through filtration. In S. Nielsen, R. Bruno, & S. Schenk (Eds.), *Non-medical and illicit use of psychoactive drugs* (Current Topics in Behavioral Neurosciences, Vol. 34, pp. 77–98). Springer. https://doi.org/10.1007/7854_2016_470
3. Kareem, S. H., & Ali, I. H. (2010). Porosity measurements of cellulose acetate filters for some brands of cigarette using mercury porosimeter. *Al-Mustansiriya Journal of Science, 21*(2), 57–66.
4. Keijzer, L., & Imbert, E. (2011). The filter of choice: Filtration-method preference among injecting drug users. *Harm Reduction Journal, 8*, Article 20. https://doi.org/10.1186/1477-7517-8-20
5. Ng, H., Patel, R. P., Bruno, R., Latham, R., Wanandy, T., & McLean, S. (2015). Filtration of crushed-tablet suspensions has potential to reduce infection incidence in people who inject drugs. *Drug and Alcohol Review, 34*(1), 67–73. https://doi.org/10.1111/dar.12196
6. Bruno, R. (2021, August 19). *Use of commercial filters among a sample of people who regularly inject drugs: Findings from the Illicit Drug Reporting System, 2016–2020* (Drug Trends Bulletin). National Drug and Alcohol Research Centre, UNSW Sydney. https://ndarc.med.unsw.edu.au
1. Steele, M., Silins, E., Flaherty, I., Hiley, S., van Breda, N., & Jauncey, M. (2018). Uptake of wheel-filtration among clients of a supervised injecting facility: Can structured education work? *Drug and Alcohol Review, 37*(1), 116–120. https://doi.org/10.1111/dar.12481
7. Jauffret-Roustide, M., Chollet, A., Santos, A., Benoit, T., Péchiné, S., Duplessy, C., Bara, J.-L., Lévi, Y., Karolak, S., & Néfau, T. (2018). Theory versus practice, bacteriological efficiency versus personal habits: A bacteriological and user acceptability evaluation of filtering tools for people who inject drugs. Drug and Alcohol Review, 37(1), 106–115. https://doi.org/10.1111/dar.12564
8. Lafferty, L., Treloar, C., van Breda, N., Steele, M., Hiley, S., Flaherty, I., & Salmon, A. (2017). "It's fast, it's quick, it stops me being sick": How to influence preparation of opioid tablets for injection. Drug and Alcohol Review, 36(6), 651–657. https://doi.org/10.1111/dar.12562
1. Sutherland, R., Karlsson, A., Uporova, J., Chandrasena, U., Tayeb, H., Price, O., Bruno, R., Dietze, P., Lenton, S., Salom, C., Radke, S., Vella-Horne, D., Haywood, S., Daly, C., Thomas, N., Degenhardt, L., Farrell, M., & Peacock, A. (2024). *Australian drug trends 2024: Key findings from the National Illicit Drug Reporting System (IDRS) interviews*. National Drug and Alcohol Research Centre, UNSW Sydney. https://doi.org/10.26190/unsworks/30464

9. Onoka, I., Banyika, A. T., Banerjee, P. N., Makangara, J. J., & Dujourdy, L. (2020). A review of the newly identified impurity profiles in methamphetamine seizures. *Forensic Science International: Synergy, 2*, 194–205. https://doi.org/10.1016/j.fsisyn.2020.06.004

10. Peck, Y., Clough, A. R., Culshaw, P. N., & Liddell, M. J. (2019). Multi-drug cocktails: Impurities in commonly used illicit drugs seized by police in Queensland, Australia. *Drug and Alcohol Dependence, 201*, 49–57. https://doi.org/10.1016/j.drugalcdep.2019.03.019

11. Qi, Y., Evans, I. D., & McCluskey, A. (2006). Australian Federal Police seizures of illicit crystalline methamphetamine ("ice") 1998–2002: Impurity analysis. *Forensic Science International, 164*(2-3), 201–210. https://doi.org/10.1016/j.forsciint.2006.01.010

12. Wheeler, A., Masters, J., Pradhan, A., Roth, J. M., Degenhardt, L., Dore, G. J., Matthews, G. V., Cunningham, E. B., Peacock, A., Colledge-Frisby, S., Grebely, J., Hajarizadeh, B., & Martinello, M. (2025). Prevalence of injecting-related bacterial and fungal infection among people who inject drugs: A systematic review and meta-analysis. Open Forum Infectious Diseases, 12(4), ofaf108. https://doi.org/10.1093/ofid/ofaf108

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